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The Spread of Conditional Cash Transfer (CCT) for Tertiary Education in the Philippines: A Bass Diffusion Model

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Abstract
This study predicts the spread of the new government program to be availed by out of school youths whose households are beneficiaries of the Pantawid Pamilyang Pilipino Program (4Ps) using the Bass Diffusion Model. The model predicts the time and magnitude of newly released products and services. The diffusion of innovations (DoI) paradigm is a way of studying the spread of a new product and services that will be adopted over time by the first adapters, then subsequent imitators and adapters that could be accommodated within the program. This model is applied to the spread of the information of the government Tertiary Education Subsidy program on the Conditional Cash Transfer (CCT) among the Filipino youth with a target of spreading the information to out of school youths. The cash transfer allows a beneficiary to enroll in tertiary education with allowance and free tuition fees. The enrolment for the first semester for five years (CY 2014-2018) was obtained from the quarterly reports of the Department of Social Welfare and Development (DSWD) and was applied in the Bass forecasting spreadsheet. Cumulative diffusion and saturation point were categorically determined by the CCT beneficiaries from the initial adapters, imitators, and the potential imitators. Findings revealed that there was a slow diffusion at the early stage of CCT beneficiaries in tertiary education. However, the forecast revealed that almost one million of the beneficiaries could benefit from the program after 30 years. It will take four years for students to finish their higher education degree before they can be considered part of the working force. Significantly, short-term course offerings that are skill-based may be offered to students to acquire knowledge, expertise in the tools, equipment, or technology and materials used and interactions they need to get a job thus, earning wages to help the family earn a living.

Keywords: Bass Diffusion Model, Conditional Cash Transfer (CCT), Tertiary Education

1. Introduction

In 2013, Functional Literacy, Education, and Mass Media Survey (FLEMMS) survey, one in every ten or about 4 million Filipino children and youth was out-of-school. Generally, there is a higher portion of youth who are out-of-school compared to the children in school. In terms of gender, females emerge higher number in out-of-school youth and youths (Functional Literacy, Education, and Mass Media Survey (FLEMMS), 2013, para. 1).

As FLEMMS described, out-of-school youth are persons aged 15 to 24 years who are not going to school, not able to finish a degree, and do not earn a living. The main reason an out-of-school wasn't able to pursue tertiary education because of financial constraints (FLEMMS, 2013, para. 2).

In the Philippines, Filipinos strongly believe that education is vital and can be handed from generation to generation. Education is a prevailing tool of development and one of the reliable apparatus for reducing poverty as it enhances the earning potential of individuals (World Bank, 2013, para. 1). Several studies reviewed the empirical evidence that university education significantly reduces the incidence of absolute poverty as mentioned by Chaudhry et al (2009). To address the issue of out-of-school youth, the Philippine government initiated the conditional cash transfer (CCT) through program Pantawid Pamilyang Pilipino Program, or 4Ps, that provides conditional cash grants to the poorest of the poor. The program aims to breakdown the cry of the poorest of the poor to have children aged 0-18 healthy and in school so that they will have a bright future. As cited by Garcia & Hill (2016) Conditional Cash Transfers (CCT) is one of the social assistance programs in education by the government that operates more than twice the number in 2008 (World Bank, 2014, p. 16).

The use of cash transfers had been gradually adopted to reduce poverty in low-income and middle-income countries (Barrientos, 2013). In Turkey, the CCT had removed educational barriers among the refugees by providing them bi-monthly cash assistance to the refugees. The refugee families received financial support and their children can regularly go to school (Yilmaz Sener, 2016). In Macedonia, Macedonian high school students had increased its high school population through the CCT. The amount of CCT varies on the number of households within the family but it ranges from 40 USD to 98 USD (Armand & Carneiro, 2018).

The CCT Program in the Philippines is patterned from Columbia CCT which greatly helps most of the low-income population. Since the start of the CCT, malnutrition has been reduced, there is an increase in school attendance especially the out-of-youth, and health is improved.

Poverty is a worldwide issue. According to Chaudhry and Okamura (2012), the multi-faces of poverty are manifested in education and health outcomes. The scenario is that school children's completion rates are very low because most school children belong to the lowest income line. According to World Bank (2018), 55

percent of the world population can averagely provide their daily needs while 45 percent belong to the poorest of the poor. More so, there is a huge number in under-five years old mortality rate (National Demographic and Health Survey, 2008) and more than quadrupled in the number of acquiring wealth among the Filipinos (National Demographic and Health Survey, 2013).

The primary goal of the CCT program is to eradicate extreme poverty in the Philippines by investing in the health and education sector. In 2014, the government enhanced the CCT and allotted a huge amount for the poor to access tertiary education through the Tertiary Education subsidy. A CCT beneficiary, who enrolls in tertiary education, enjoys the allowance of Php 3,500 per month, free tuition, and miscellaneous expenses. Since its inception, it is assumed that there would be more enrollees in undergraduate education.

Hence this study investigated the trend of undergraduate enrolment of Conditional Cash Transfer (CCT) beneficiaries for the past five years (2014-2018) in Philippine schools and how the information about the CCT diffused applying the Bass Diffusion Model. The diffusion model is a valuable insight into the outcome of the tertiary education subsidy program.

2. Conceptual Framework

The Bass Diffusion Model, developed by Frank M. Bass (1969), predicts the time and magnitude of newly released products or services. The diffusion of innovations (DoI) paradigm is a way of studying the spread of a new product in the marketplace and whether the product will be adopted over time. In the 1960s, the mathematical model called Bass diffusion is used to study new product adoption on the market. There are three basic elements of a diffusion process namely the presence of first adopters, then subsequent imitators and adopters that can be accommodated within the program.

The Bass Diffusion Model makes several assumptions. We classify these assumptions into three broad categories based on whether they relate to: (a) the innovation, (b) the context, or (c) modeling and estimation (Jeyaraj & Sabherwal, 2014). In this study, the innovation is the new program of the government under the Conditional Cash Transfer Program, of giving cash grants to qualified beneficiaries of the PPP to enroll in tertiary education. The cash grant is called the Tertiary Education Subsidy of Php3,500 monthly allowance and free tuition fee and miscellaneous fees. In context, the value of innovation does not change over time. Late adopters or the imitators have the same privileges as the first adopters. The modeling or estimation can be assumed when the innovation is not changed and the adopters do not quit the 4-year degree program.

In this study, Bass Diffusion Model is applied to the spread of the information of the government Tertiary Education Subsidy program on the Conditional Cash Transfer (CCT) among the youth with a target of spreading the information to out of school youth. The first beneficiaries of the program in 2014 are considered the first adapters

and the beneficiaries in the succeeding years are the imitators. The diffusion perspective was introduced into the beneficiaries for it represents the flow of information of the services offered by the government. The utilization of the Bass Diffusion Model in this study predicts the saturation of the Conditional Cash Transfer (CCT) beneficiaries in Higher Education.

3.Methodology

In estimating the parameters of the number of enrollees on CCT beneficiaries, five data points (2014-2018) using the enrolment during the first semester of each academic year. The data were obtained from the third quarter reports of the Department of Social Welfare and Development (DSWD) published on the net. The Bass model calibration concentrates on the values of p as the first adapter, q as the imitator, and m as the potential beneficiaries of CCT. The parameter p is provided by the initial adapter p_t of CCT beneficiaries enrolled in tertiary education for a duration of one academic year (2013-2014). Hence, to determine the saturation point of imitators over time, we use the Bass Diffusion Model utilizing the equation,

$$\frac{d\,F(t)}{dt} = [p + q\,F(t)][1 - F(t)]$$

where:

p = first adapters
q = imitators
F(t) = those who imitate
1 – F(t) = not yet adapted

The data on initial adapters were then applied in the Bass Forecasting Spreadsheet. The succeeding processes include generating cumulative diffusion graphs and Bass Graph f showing the cumulative diffusion and saturation level of the beneficiaries (imitators).

4. Results and Discussion

Baseline Data. As of September 2014, the Pantawid Pamilyang Pilipino Program has reached the 4,326,208 household members of the 144 cities and 80 municipalities in the country. Only 4,173,528 from the total households are covered by the regular Pantawid Pamilyang Pilipino Program while the rest are Modified Conditional Cash Transfer (MCCT). The MCCT beneficiaries are those who are homeless and families living in the street, which does belong in the regular CCT and IP households in the geographically isolated and disadvantaged areas (GIDA) (Department of Social Welfare and Development, 2014).

It was also during this year that the Tertiary Education subsidy in 2014, was implemented. The first beneficiaries enrolled in colleges and universities in the country reached 27,280 beneficiaries. Comparing this with the registered PPP beneficiaries, it is only about 0.6 % which suggests that the information about this tertiary education program was not well disseminated, even considering other reasons for not enrolling. Although enrolment was increasing every year, and

assuming that there is one potential tertiary student in 25 percent of the total PPP beneficiaries, the expected number of enrollees would reach 1,143,382. So, the Bass model could predict when this target enrollment can be reached.

The Enrolment Trend. Figure 1 presents the five-year enrolment of the CCT beneficiaries showing an increasing trend with the highest increase in 2018 (26.35%) and the highest decrease in 2017 (21.89%). It also shows the enrolment of CCT beneficiaries from the time of the first recorded enrolment and the cumulative enrolment for five years.

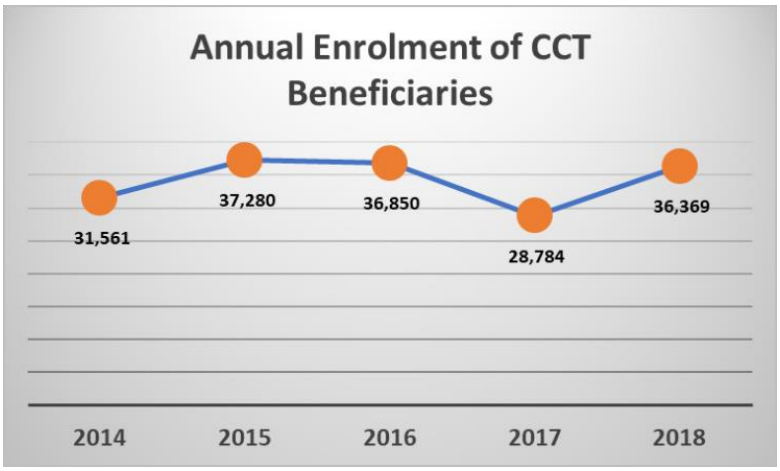

Figure 1. Annual Tertiary Education Enrolment of Conditional Cash Transfer (CCT) Beneficiaries, (2014-2018)

There is an increasing number of enrollees from the start of the conditional cash transfer program for tertiary education. Though there was a slight decrease in the number of enrollees in 2017 which may be caused by the change of the government administration more students availed of the CCT in the succeeding years. This means that as the years increase more students have accessed to tertiary education despite poverty. It is assumed that more students have heard about the program and availed of the education grant.

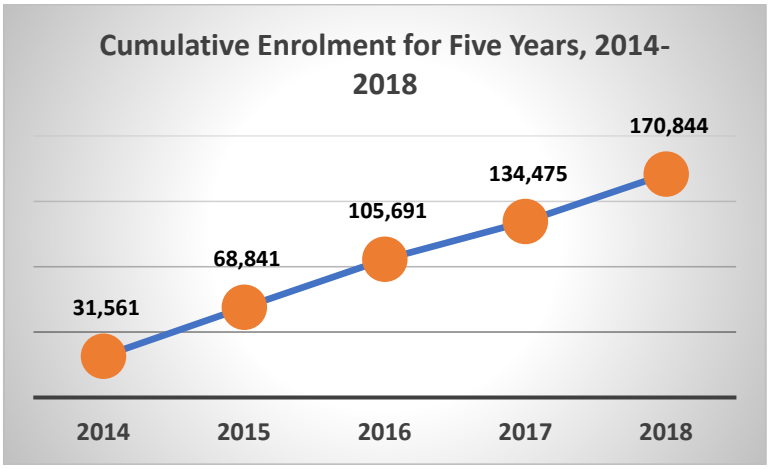

Figure 2. Cumulative Tertiary Education Enrolment of Conditional Cash Transfer (CCT) Beneficiaries, (2014-2018)

The Bass Diffusion Model. Forecasting of the diffusion for tertiary education enrolment of the beneficiaries of conditional cash transfer is shown in Figure 3.

Bass Model Data

Potential Market M	1,000,000	*p*	0.0032	*q*	0.1970		0.181205	
Year	2014	2015	2016	2017	2018	2019	2020	2021
Data	31,561	37,280	36,850	28,784	35,359	55,879	61,293	66,707
Cumulative Adoptions	31,561	68,841	105,691	134,475	169,834	225,713	287,005	353,712
F(t)	0.031561	0.068841	0.105691	0.134475	0.169834	0.225713	0.287005	0.353712
dy/dt	0.037280	0.036850	0.028784	0.035359	0.055879	0.061293	0.066707	0.072121
q	1.118122644	0.52829661	0.274194334	0.279953833	0.377453058	0.336508519	0.314811457	0.306425224
Bass Model f	0.00354	0.00782	0.01301	0.01927	0.02682	0.03588	0.04672	0.05963
Bass Model Cum f	0.00354	0.01136	0.02437	0.04364	0.07046	0.10634	0.15305	0.21269
t	1	2	3	4	5	6	7	8

Figure 3. Forecast of the tertiary education enrolment of CCT Beneficiaries

The Bass Model data in Figure 2 forecasted until 2050, but Figure 2 shows only until 2021. The study wanted to validate the forecast after 2018. It was expected that the enrolment of 2020 will greatly decrease due to the COVID pandemic. However, with the online delivery of learning in undergraduate studies, it is expected that more students would enroll in the succeeding years. Many students that are PPP beneficiaries have been informed about these CCT grants online and have also realized that there is less expense in online learning.

The Bass Model in Figure 4 depicts the S-curve of the projection of the enrolment until 2050. The enrolment is expected to increase as much as 100 % (about 1,000,000) which is only 25% of the targeted PPP beneficiaries. The projected cumulative enrolment was reached by 2028, and this could increase to about 4,000,000 by 2050.

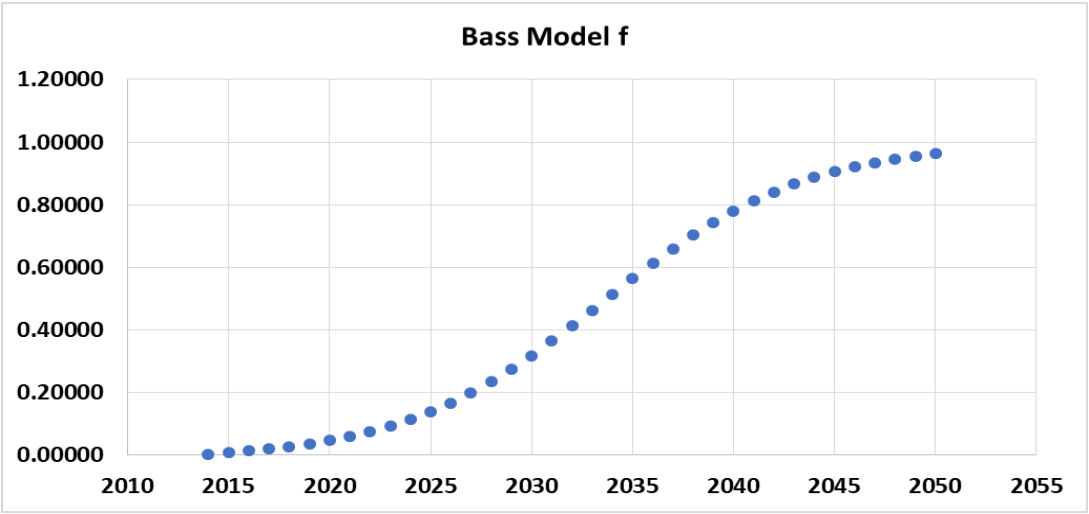

Figure 4. Bass Diffusion S-Curve for Tertiary Education Enrolment of Conditional Cash Transfer (CCT) Beneficiaries

The model shows that the probability of spreading the information by the first adopters in 2014 was slower for the first five years (until 2020) thus imitators also slowly increased. However, setting aside the COVID pandemic, an increase in imitators would have greater leaps starting in 2021. But this increase is not expected due to the health crisis not only in the Philippines but worldwide. This model is also expected to reach a plateau when imitators would already saturate. However, the model shows that this saturation point seemed to start by 2045 when the S curve seems to be flattened after this year. This is about 30 years after the inception of the CCT for students enrolled in the tertiary level. By this time, if the government program is still in place, then there is a probability that almost every PPP beneficiary is aware of this program and those who are qualified for the CCT could already apply.

The study of Horvat et al (2020) also revealed that to foster the expansion of awareness of an innovation or new product is through word-of-mouth. Their research goal is to extend the existing system dynamics Bass diffusion model to find out the process of adoption of a new food product through the perceptions of the customers or consumer. The study of Barkoczi et al (2015) aimed to find out how many consumers will likely adopt the new technology and when will they adopt it. They found out that the more persons adopt the new technology, the more the potential adopters see the increased value brought by the new product. Consumer interaction by word of mouth affects the adoption of the new technology. Adoption was relatively strong during the early stage. During this stage when adoption was growing strong, the number of innovators decreases, while the number of imitators increases. Their findings contradict this study since early adoption was very slow and made stronger growth in later years.

Cumulative diffusion is manifested in the changes in the number of beneficiaries that imitate the subsequent imitators each year. By the year 2045, Conditional Cash Transfer (CCT) beneficiaries saturate which means that in 30 years, it close to 1M (958,897) as shown in Figure 5 can avail and could benefit the program. This is one-fourth of the four million less fortunate students (4Ps beneficiaries) in the country who can be accommodated in the program. As the number of poor students who can avail increases per year there a probability that there would be more graduates in the bachelor's degree program, which leads to probable employment. Figure 6 presents the adopters only for clear visualization, how they increased since 2014. The graph clearly shows that there was a great decrease in 2017 which could be attributed to the new administration which may have affected the recruitment, processing, and budget of this program.

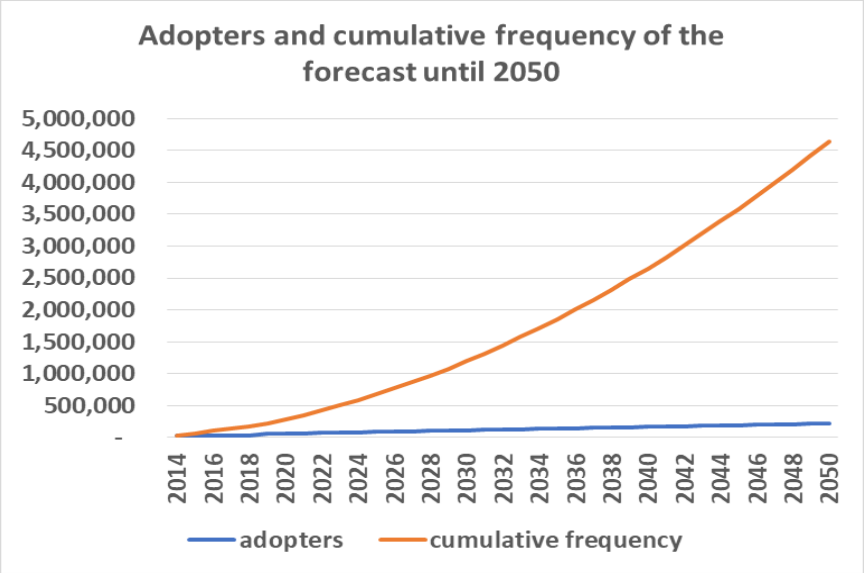

Figure 5. Adopters and Imitators of the Bass Diffusion model on the Enrolment of CCT Beneficiaries

The quarterly report of the DSWD revealed that several graduates are honor students or recipients of awards or distinctions. For Academic Year 2018-2019, there are a total of 6,414 graduates. Out of the total number of graduates, 252 graduated with honors and awards. Out of these, 17 are Magna Cum Laude, and 235 are Cum Laude (DSWD, 2020, p. 24). This implies that the CCT program of the government has great outputs and may later have an impact on the employability of graduates.

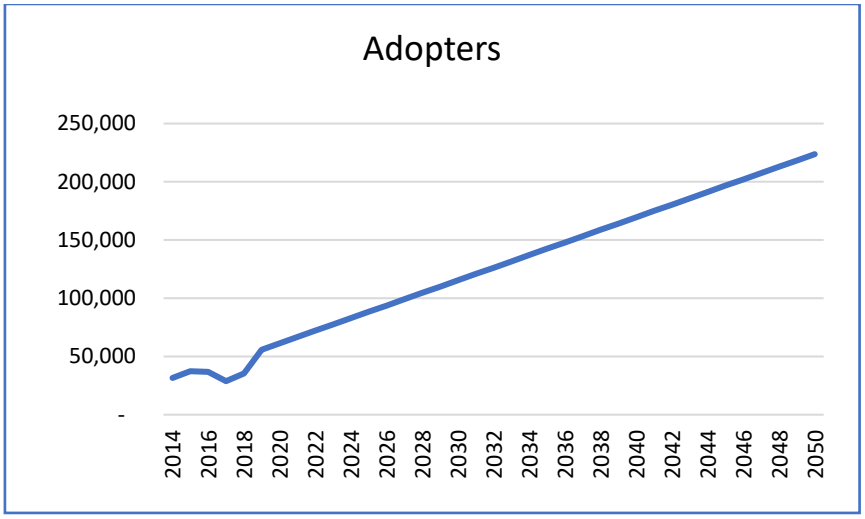

Figure 6. The adopters of the CCT Program

Tertiary education in the Philippines usually takes a four-year program before one can graduate. Even with the additional two years in senior high school, still, tertiary degree programs did not decrease the number of years to finish. This would take four years for the CCT beneficiaries to graduate and be gainfully employed. Although being a bachelor's degree holder is not a guarantee for an immediate job. More so if these graduates have not acquired the necessary skills for a job applied for.

5. Conclusion and Recommendations

The Bass diffusion model a slow base run diffusion process. The main learning outcome that diffusion was strongly affected by the word-of-mouth mechanism since beneficiaries only were informed by the first adopters. Therefore, greater attention should be to trigger existing beneficiaries to communicate their good experiences with other 4Ps beneficiaries.

Moreover, this adoption of the cash grant for tertiary education is hindered by application requirements and passing the entrance examinations in colleges and universities. Additionally, this problem is not given priority and is not tackled by any institution since reports of the Department of Social Welfare and Development (DSWD), Commission on Higher Education (CHED), and Department of Labor and Employment (DOLE) never mentioned this as an issue. More dissemination strategies could be done to diffuse the information to the maximum, through media and career talks in senior high schools who are PPP beneficiaries.

Since the CCT program is for a four-year course, and could only be availed after passing an entrance exam, those in the lower cognitive levels could never avail of such benefit. In the current post-industrial and increasing knowledge-intensive economy, there is a need for Higher Education institutions to establish training opportunities for mid-level professionals as mentioned by Altbach et al (2009). Thus, there is a need for higher education institutions to offer significant courses that respond to the needs of the industry that also spells out the needs of its graduates where skills can be developed in a short period for them to earn a living and to participate in the economic activities of the country.

Hence, it is recommended that CCT can be availed of by students who will enroll in skill-based education for them to help the family in alleviating poverty in a short period. In this way, there would be more adopters of the program, and outcomes are observed at a shorter period.

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